



**CITY OF SUNNYVALE  
REPORT  
Administrative Hearing**

**June 14, 2006**

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**SUBJECT:**           **2006-0328 – T-Mobile** [Applicant] **Sunnyvale Park IV LLC**  
***et al*** [Owner]: Application for a 30,450 square foot site  
located at **840 West California Avenue** (near N Mathilda  
Ave) in an M-S/PD (Industrial & Service/Planned  
Development) Zoning District.

Motion               Special Development Permit to allow six antennas and  
ancillary equipment on the roof.

**REPORT IN BRIEF**

**Existing Site**           R&D Building  
**Conditions**

**Surrounding Land Uses**

North	Industrial office and multi-family residential
South	Railroad tracks, Evelyn Avenue and residential beyond
East	Industrial office and the Mathilda Avenue overpass
West	Apartments

**Issues**               Visual impacts of antennas

**Environmental**       A Class 1 Categorical Exemption relieves this project  
**Status**               from California Environmental Quality Act provisions  
and City Guidelines.

**Staff**                 Denial  
**Recommendation**



**PROJECT DATA TABLE**

	<b>EXISTING</b>	<b>PROPOSED</b>	<b>REQUIRED/ PERMITTED</b>
<b>General Plan</b>	Industrial	Same	Same
<b>Zoning District</b>	M-S/PD/Southern Pacific Corridor Specific Plan	Same	Same
<b>Lot Size (s.f.)</b>	30,450	Same	N/A
<b>Gross Floor Area (s.f.)</b>	58,000	Same	N/A
<b>No. of Buildings On- Site</b>	9	Same	N/A
<b>Gross Floor Area (s.f.) of Equipment Footprint on Roof</b>	0	250	N/A
<b>Building Height (ft.)</b>	44'9"	Same	75' max.
<b>No. of Stories</b>	2	Same	8 max.
<b>Height of Proposed Antennas as Measured from Rooftop</b>	N/A	6'	15' max with Minor Use Permit

**ANALYSIS****Description of Proposed Project**

The proposed location is a two-story office building within an existing office park, which contains nine similar buildings. The proposed building is located closest to the multi-family residential units on the west side of the property, and closest to the railroad and Evelyn Avenue (Attachment C).

The six proposed antennas would be located on each end of the building and would extend six feet above the screen wall on the roof. The antennas are not screened from view to the surrounding areas. The equipment area is 250 square feet in size and will be approximately 6 feet tall, but would not extend above the roof screen and would not be visible from surrounding areas (Attachments D).

**Background**

**Previous Actions on the Site:** The following table summarizes previous planning applications related to the subject site.

File Number	Brief Description	Hearing/Decision	Date
1998-0563	10 Lot Industrial Subdivision	Approved	3/10/97

**Environmental Review**

A Class 1 Categorical Exemption relieves this project from California Environmental Quality Act provisions and City Guidelines. Class 1 Categorical Exemptions includes minor alterations to existing facilities.

**Special Development Permit**

**Use:** The telecommunication facility will provide wireless telecommunications service for T-Mobile. This is one of a network of transmit/receive facilities that carry signals between users on the network. This facility will be serviced by a technician on an as-needed basis, which is typically once per month. The use meets the requirements of the Federal Communications Commission for radio frequency emissions (Attachment F).

**Site Layout:** The building is an R&D office within an existing business park. The park consists of nine 2-story buildings and the Libby water tower. The subject building is located in the southwest corner of the property approximately 240' from the multi-family residential property 75' from Evelyn Avenue. The building is easily visible from the business park and from Evelyn Avenue. The building is partially screened from view of the adjacent multi-family residential property.

Staff is concerned about the visual impact of the antennas on the area. Staff discussed the concerns and possible solutions with the applicant, but no changes were made to the design to address those concerns.

**Description of Antennas:** The antenna location and installation design is the greatest concern with the project. There are many ways to screen antennas from view of arterial streets, the railroad, the Business Park and adjacent properties. There is no screening of the antennas proposed. The proposed design is to mount the antennas on mounting pipes at 3 locations on the roof of the building. There are 2 antennas at each of these 3 locations. The six antennas will extend 6' above the top of the roof screen.

Staff discussed the antenna design with the applicant to see if other options were acceptable. Among the options that were discussed were:

- Combine the 2 antennas into a radome (chimney-type structures which conceal the antennas) at each location. The effect is to create 3 chimney-type projections above the roof which would conceal the mounting pipe, antennas, LNA's, coax, etc. The applicant stated this option is the least desirable for their objectives because fewer antennas would be possible.
- Build a vertical extension from the sloping tile roof in which the antennas and necessary equipment would be mounted. Build these extensions at each end of the building for the 3 antenna sectors. This design option would reduce any vertical element from extending above the top of the roof line. The applicant stated the landlord would not accept this option and that the reduction in antenna height would provide less desirable coverage.
- Façade-mount the antennas on the side of the building. The antennas could be mounted flush against the building and painted to match the wall. This would be the ideal design solution. The applicant state the reduction in height of the antennas with this design would provide less desirable coverage.
- Add a new freestanding tree pole near other trees on site. This type of design would successfully screen the antennas from view. The added benefit of this design is that co-location of other carrier antennas would be easily accomplished without creating additional visual impacts.

**Equipment:** The equipment will be mounted on the roof and will be screened from view by the existing screen wall.

**Parking/Circulation:** The shelter will not take up any parking spaces on the property. Access to the roof will be gained through a roof hatch in the building. Maintenance will occur periodically and consists of a van or truck which will require one parking space.

**Compliance with Development Standards and Expected Impact on the Surroundings:** The following sections of the Sunnyvale Municipal Code 19.54 apply to the proposal:

*19.54.040(a)- Based on aesthetic impact, the order of preference for facility type is: façade mounted, roof mounted, ground mounted and freestanding tower.*

*19.54.040(b)- All facilities shall be designed to minimize the visual impact to the greatest extent feasible, considering technological requirements, by means of placement, screening, and camouflage, to be compatible with existing architectural elements and building materials, and other site characteristics. The*

*applicant shall use the smallest and least visible antennas possible to accomplish the owner/operator's coverage objectives.*

*19.54.040(k)- Roof mounted antennas shall be constructed at the minimum height possible to serve the operator's service area. Roof mounted antennas shall be designed to minimize their visibility.*

This project has been designed to meet the optimal design objectives of T-Mobile, not the City requirements to minimize the visual impact to the greatest extent possible and do not meet the intent of the Telecommunications Ordinance. The impact would be to the existing Business Park, nearby arterial roads and adjacent residential properties.

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**Fiscal Impact**

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No fiscal impacts other than normal fees and taxes are expected.

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**Public Contact**

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Staff received one telephone call from a neighbor at the adjacent multi-family residential units. His concern was whether the site would be visible and regarding possible health impacts.

Notice of Public Hearing	Staff Report	Agenda
<ul style="list-style-type: none"><li>Published in the <i>Sun</i> newspaper</li><li>Posted on the site</li><li>361 notices mailed to property owners and residents adjacent to the project site</li></ul>	<ul style="list-style-type: none"><li>Posted on the City of Sunnyvale's Website</li><li>Provided at the Reference Section of the City of Sunnyvale's Public Library</li></ul>	<ul style="list-style-type: none"><li>Posted on the City's official notice bulletin board</li><li>City of Sunnyvale's Website</li></ul>

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**Conclusion**

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**Findings and General Plan Goals:** Staff is recommending denial for this project because the proposed telecommunications facility has not been designed to minimize the visual impacts to the greatest extent possible. It is possible to create a design that better conceals the antennas while still meeting necessary coverage objectives. Therefore, the Findings (Attachment A) were not made. However, if the Hearing Officer is able to make the required findings, staff is recommending the Conditions of Approval (Attachment B).

**Conditions of Approval:** Conditions of Approval are located in Attachment B.

## **Alternatives**

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1. Deny the Special Development Permit.
2. Approve the Special Development Permit with attached conditions.
3. Approve the Special Development Permit with modified conditions.

## **Recommendation**

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Alternative 1.

Prepared by:

Andrew Miner  
Project Planner

Reviewed by:

Steve Lynch  
Senior Planner

Attachments:

- A. Recommended Findings
- B. Recommended Conditions of Approval
- C. Site and Architectural Plans
- D. Photosimulations
- E. Letter from the Applicant
- F. EMF Report

**Recommended Findings - Special Development Permit**

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1. The proposed use does not attain all the objectives and purposes of the General Plan of the City of Sunnyvale. The Wireless Telecommunications Policy promotes retention of local zoning authority when reviewing telecommunications facilities. The zoning code requires that the location of telecommunication facilities be designed with sensitivity to the surrounding areas. The proposed facility is not compliant with the following wireless telecommunication development standards:
  - The antennas are not screened from view of surrounding areas or streets and do not match the building.
  - The antennas have not been designed to blend in with the building and are readily visible from the Business Park and major arterial streets.

**Telecommunications Policy**

*Action Statement A.1.e- Support retention of local zoning authority for cellular towers, satellite dish antennas, and other telecommunications equipment, facilities and structures.*

The zoning code requires that the location of telecommunication facilities be designed with sensitivity to the surrounding areas. The proposed antennas extend, unconcealed, above the existing roof screen and is visible to the surrounding properties.

**Land Use and Transportation Sub-Element**

*N1.3. Promote an attractive and functional commercial environment.*

*N1.5 Establish and monitor standards for community appearance and property maintenance.*

The project proposal uses existing infrastructure to add additional telecommunications service in the city. The location of the antennas on the building, however, does not mitigate visual impacts in order to maintain community appearance. There is no concealment of the antennas, which make them more visible to the surrounding areas, which is contrary to the Telecommunications Ordinance.

2. The proposed use is desirable but would not be materially detrimental to the public welfare or injurious to the property, improvements or uses within the immediate vicinity and within the Zoning District as the proposed antennas would extend above the existing roof screen unconcealed from view to the surrounding areas.



Therefore, the proposed project does not meets the visual standards established by the City for telecommunication facilities because it does not attempt to conceal the antennas on the roof.

**Conditions of Approval - Use Permit**

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In addition to complying with all applicable City, County, State and Federal Statutes, Codes, Ordinances, Resolutions, the Permittee expressly accepts and agrees to comply with the following Conditions of Approval for this Permit.

**1. Project-Specific Conditions**

- a. Obtain Building Permits prior to construction/installation activity.
- b. Any major modification or expansion of the approved use shall be approved at a separate public hearing by the Director of Community Development. Minor modifications shall be approved by the Director of Community Development.
- c. If not exercised, this Use Permit shall expire two years after the date of approval by the final review authority.
- d. The proposed antennas shall match the color of the existing building.

**2. Standard Requirements for Telecommunications Facilities**

- a. Every owner or operator of a wireless telecommunication facility shall renew the facility permit at least every five years from the date of initial approval.
- b. Each facility must comply with any and all applicable regulations and standards promulgated or imposed by any state or federal agency, including, but not limited to, the Federal Communications Commission and the Federal Aviation Administration.
- c. Certification must be provided that the proposed facility will at all times comply with all applicable health requirements and standards pertaining to RF emissions.
- d. The owner or operator of any facility shall obtain and maintain current at all times a business license issued by the city.
- e. The owner or operator of any facility shall submit and maintain current at all times basic contact and site information on a form to be supplied by the city. Applicant shall notify city of any changes to the information submitted within thirty (30) days of any change, including change of the name or legal status of the owner or operator. This information shall include, but is not limited to the following:
  1. Identity, including name, address and telephone number, and legal status of the owner of the facility including official identification numbers and FCC certification, and if different from the owner, the

- identity and legal status of the person or entity responsible for operating the facility.
2. Name, address and telephone number of a local contact person for emergencies.
  3. Type of service provided.
- f. All facilities and related equipment, including lighting, fences, shields, cabinets, and poles, shall be maintained in good repair, free from trash, debris, litter and graffiti and other forms of vandalism, and any damage from any cause shall be repaired as soon as reasonably possible so as to minimize occurrences of dangerous conditions or visual blight. Graffiti shall be removed from any facility or equipment as soon as practicable, and in no instance more than forty-eight (48) hours from the time of notification by the city.
  - g. Each facility shall be operated in such a manner so as to minimize any possible disruption caused by noise. Backup generators shall only be operated during periods of power outages, and shall not be tested on weekends or holidays, or between the hours of 10:00 p.m. and 7:00 a.m. on weekday nights. At no time shall equipment noise from any source exceed an exterior noise level of 60 dB at the property line.
  - h. Each owner or operator of a facility shall routinely and regularly inspect each site to ensure compliance with the standards set forth in the Telecommunications Ordinance.
  - i. The wireless telecommunication facility provider shall defend, indemnify, and hold harmless the city or any of its boards, commissions, agents, officers, and employees from any claim, action or proceeding against the city, its boards, commission, agents, officers, or employees to attack, set aside, void, or annul, the approval of the project when such claim or action is brought within the time period provided for in applicable state and/or local statutes. The city shall promptly notify the provider(s) of any such claim, action or proceeding. The city shall have the option of coordinating in the defense. Nothing contained in this stipulation shall prohibit the city from participating in a defense of any claim, action, or proceeding if the city bears its own attorney's fees and costs, and the city defends the action in good faith.
  - j. Facility lessors shall be strictly liable for any and all sudden and accidental pollution and gradual pollution resulting from their use within the city. This liability shall include cleanup, intentional injury or damage to persons or property. Additionally, lessors shall be responsible for any sanctions, fines, or other monetary costs imposed as a result of the release of pollutants from their operations. Pollutants mean any solid, liquid, gaseous or thermal irritant or contaminant, including smoke, vapor, soot, fumes, acids, alkalis, chemicals, electromagnetic waves and

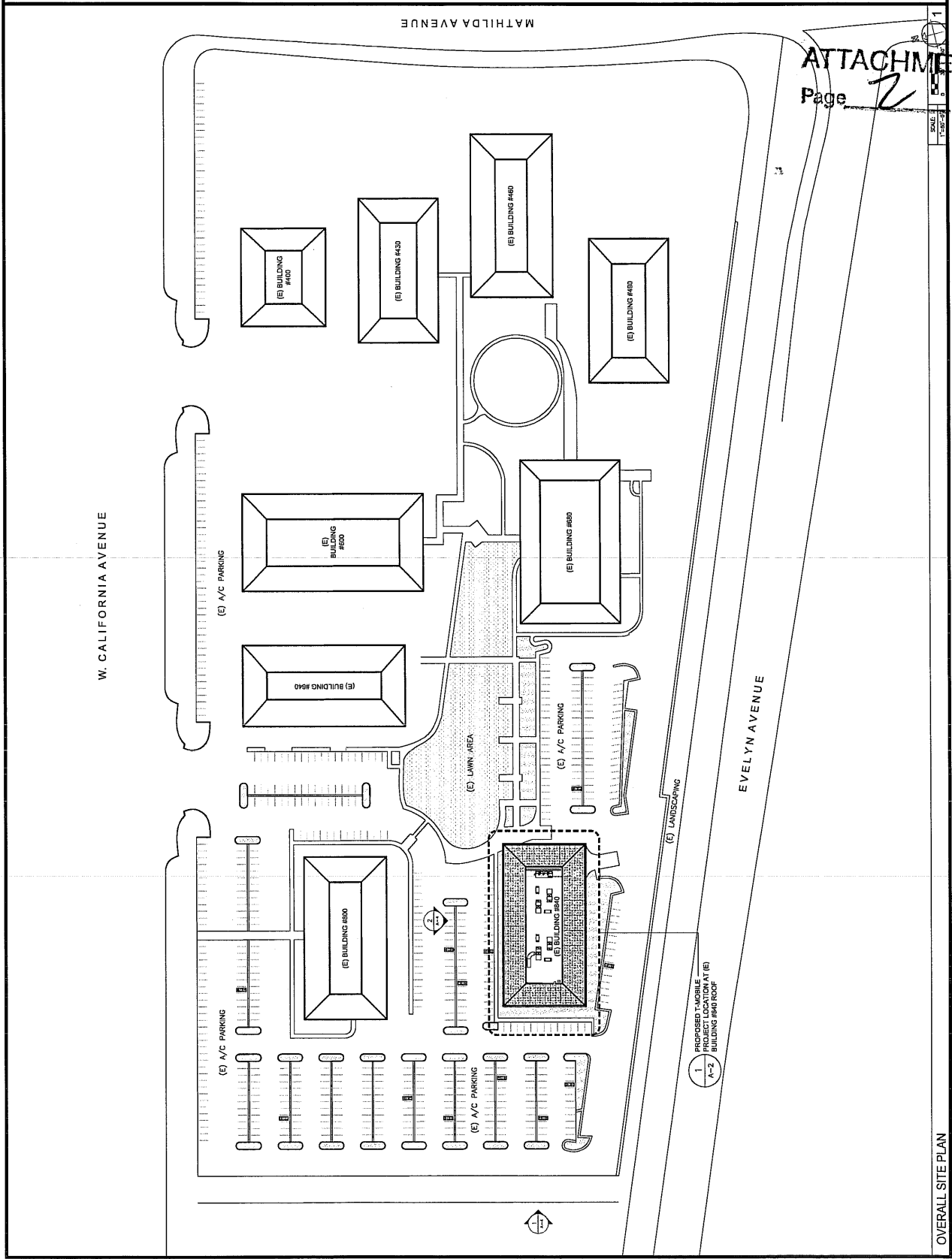
waste. Waste includes materials to be recycled, reconditioned or reclaimed.

- k. Wireless telecommunication facility operators shall be strictly liable for interference caused by their facilities with city communication systems. The operator shall be responsible for all labor and equipment costs for determining the source of the interference, all costs associated with eliminating the interference, (including but not limited to filtering, installing cavities, installing directional antennas, powering down systems, and engineering analysis), and all costs arising from third party claims against the city attributable to the interference.
- l. No wireless telecommunication facility shall be sited or operated in such a manner that is poses, either by itself or in combination with other such facilities, a potential threat to public health. To that end no facility or combination of faculties shall produce at any time power densities in any inhabited area that exceed the FCC's Maximum Permissible Exposure (MPE) limits for electric and magnetic field strength and power density for transmitters or any more restrictive standard subsequently adopted or promulgated by the city, county, the state of California, or the federal government.

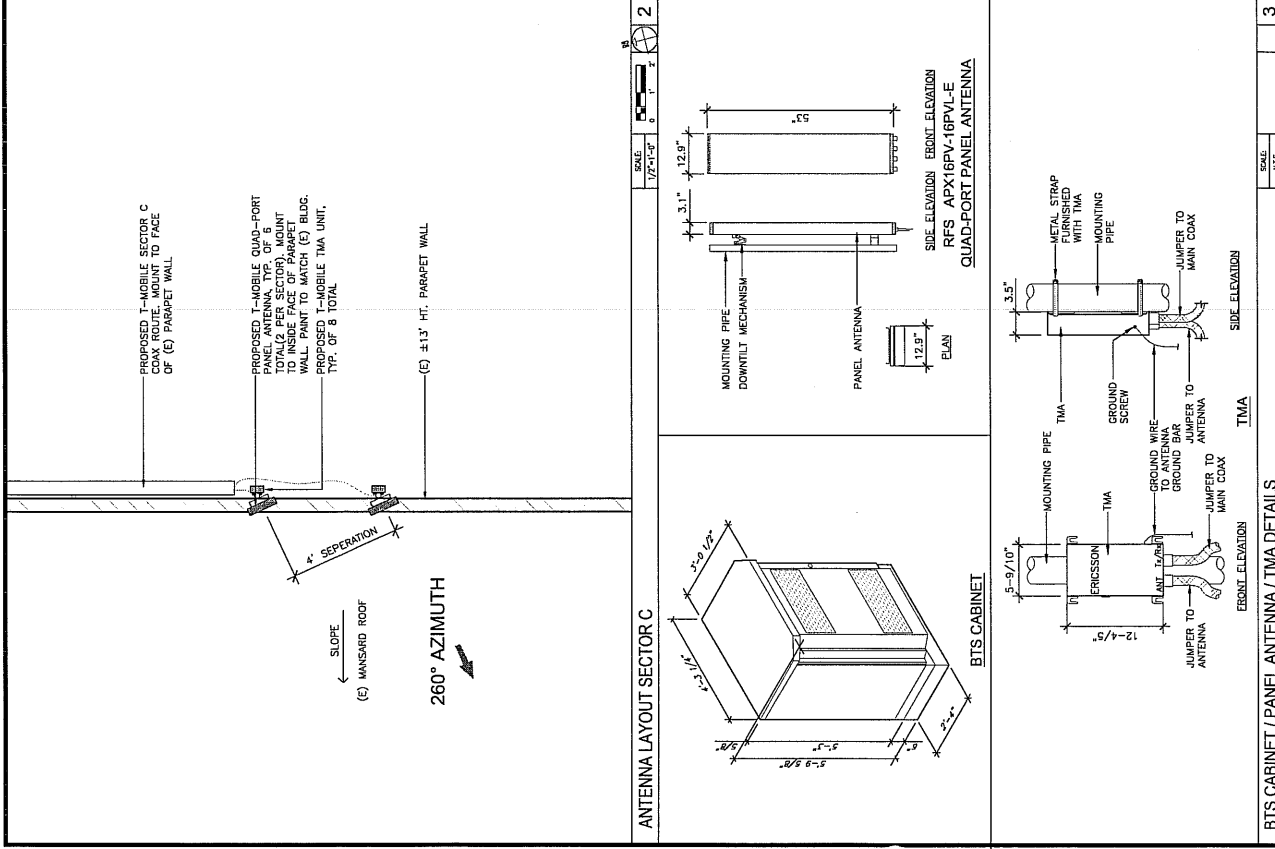


OVERALL SITE PLAN	SHEET NUMBER	A-1
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ATTACHMENT C  
Page 2 of 5

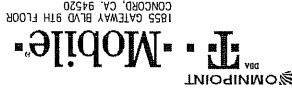








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SF14136  
SUNNYVALE  
BUSINESS PARK  
840 W. CALIFORNIA AVE  
SUNNYVALE, CA 94086

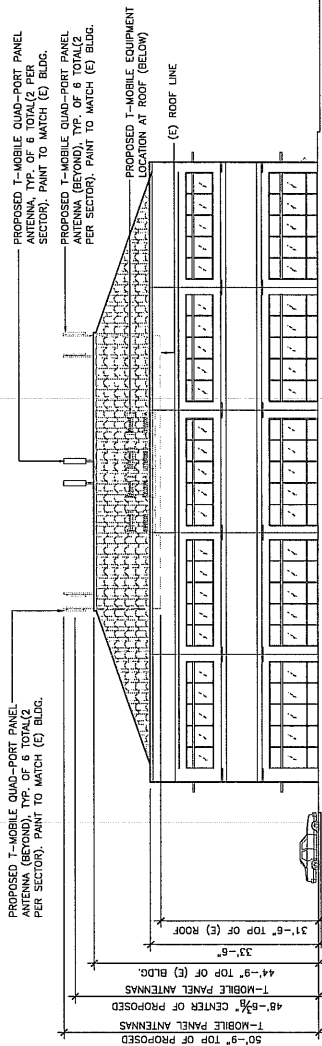
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DRAWN BY	JAMES VACUARO
CHECKED BY	MICHAEL WILK
DATE	11/27/06
ISSUE	90% ZONING
NO.	2
DATE	3/16/06
ISSUE	100% ZONING

SHEET TITLE	ELEVATIONS
SHEET NUMBER	A-4 <sup>3</sup>

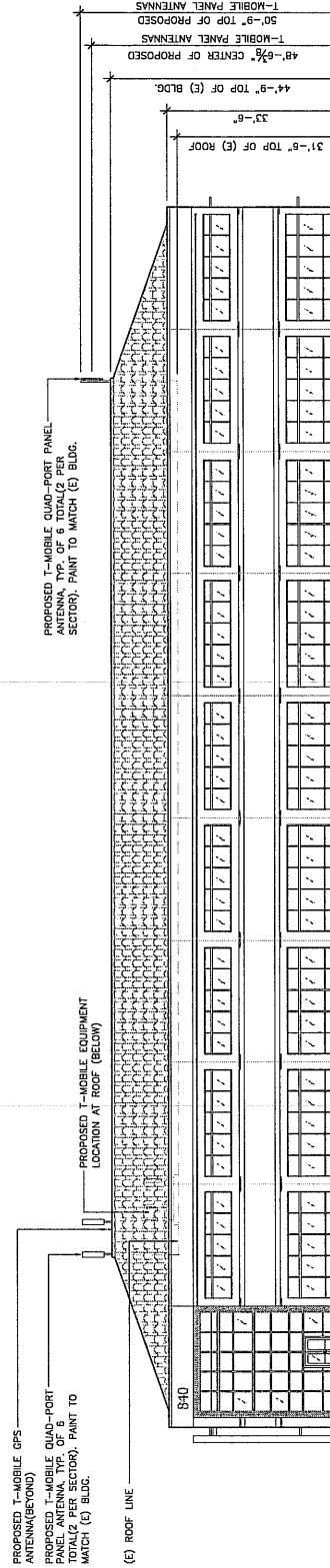
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WEST ELEVATION



NORTH ELEVATION

0328

Existing

ATTACHMENT

Page 1 of 2



**T-Mobile** SF14136

**Sunnyvale  
Business Park**

840 W. California Ave.  
Sunnyvale, CA 94086

Proposed

proposed T-Mobile antennas



Photomontage of the proposed telecommunication facility as seen looking east from the business park parking lot

Photosimulation of the proposed telecommunication facility as seen looking west from the lawn area

# Existing



**T-Mobile** SF14136

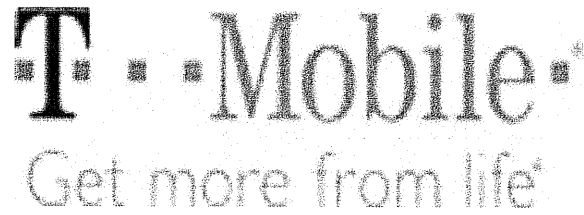
**Sunnyvale  
Business Park**

840 W. California Ave.  
Sunnyvale, CA 94086

# Proposed

proposed T-Mobile antennas



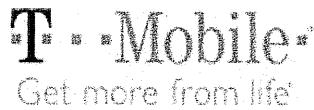


**Minor Use Application  
For  
T-Mobile  
Site No. SF 14136**

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Address: 840 West California Avenue  
APN# 165-26-018  
Zoning: MSPD  
Property Owner: Sunnyvale Business Park IV LLC

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## Project Information

Address: 840 West California Avenue  
APN# 165-26-018  
Zoning: MSPD  
Property Owner: Sunnyvale Business Park IV LLC

T-Mobile Site No. SF 14136 Sunnyvale Business Park

## Zoning General Plan Designation

The site is currently zoned MSPD  
The subject parcel is owned by Sunnyvale Business Park IV LLC

## Project Description

T-Mobile proposes to install six (6) panel antennas (two antennas per sector, comprising three sectors total) mounted to the rooftop parapet wall of an existing building located inside of the Sunnyvale Business Park at West California Avenue. The 6 panel antennas would be positioned along the North East, South East corners of the existing building's parapet wall as well as on the building's West parapet wall. The antennas are approximately 5 feet high and extend approximately six feet over the rooftop parapet wall in order to ensure the bottom of the antennas adequately clear the parapet wall and avoid possible signal interference. The T-Mobile project proposal involves the minimum height increase necessary over the parapet wall to minimize visual impact to the extent feasible while achieving the required coverage objective set forth for the T-Mobile network in Sunnyvale.

The application also entails placing four (4) corresponding equipment cabinets on the rooftop floor below the parapet wall which are hidden from public view. Both power and telephone services will be provided from existing connections inside of the building. T-Mobile's antenna dimensions measure approximately 54"x12"x3.5" (LxWxD). Each radio equipment cabinet measures approximately 4' wide and 5' tall.

T-Mobile submits that the proposed facility will enhance wireless phone coverage in this corridor of Sunnyvale while increasing much needed capacity in order to allow for the



integration of new safety and consumer-oriented services into the surrounding community.

## Approval Request

T-Mobile respectively requests the City of Sunnyvale's approval of the Minor Plan Permit to install and operate a wireless communications facility located at 757 Lois Avenue. The establishment and operation of this wireless communications facility as proposed will not create unusual noise, traffic or other conditions or situations that may be objectionable, detrimental or incompatible with other permitted uses in the vicinity. This determination is supported by the following:

1. The proposed facility is consistent with the provisions of the Zoning Ordinance for the City of Sunnyvale.
2. The proposed facility falls well below the FCC's radio frequency guidelines. Please refer to the attached Radio Frequency Report section for additional information.
3. The proposed facility is in a location that will not interfere with existing land uses on the subject property and throughout the surrounding area. The facility operates quietly or virtually noise free.
4. The proposed facility will not have a significant visual impact to the surrounding areas.
5. The proposed facility will contribute to the provision of an enhanced wireless communication technology for general public and emergency service use.
6. The establishment and operation of the proposed wireless communication facilities is not expected to have any negative impact on the environment.

## Site Selection Analysis

Wireless systems are expanded or introduced in a given area to improve service to customers. There are several reasons to add a new facility. It may extend the coverage to new areas, increase the capacity of the system within the current service area, or improve quality. Some wireless facilities accomplish all three improvements.

This location was also selected because of its position relative to existing sites, providing favorable site geometry for federally mandated E911 location accuracy requirements and efficient frequency reuse. Since 40 percent of 911 calls are from mobile phones, effective site geometry within the overall network is needed to achieve accurate location information of mobile users, through triangulation with active wireless facilities.

This site was determined to fulfill a need for coverage.

### Coverage:

Coverage can be defined as having a certain minimum level of signal strength in a particular area. T-Mobile's target is to provide -76dBm of signal strength to our customers' areas across the network. This level of service guarantees reliable signal strength inside buildings to provide excellent voice quality in residential neighborhoods and commercial areas. In today's competitive marketplace, T-Mobile requires high quality coverage to be competitive and to fulfill our responsibilities under our FCC license, and comply with CPUC mandates

**Capacity:**

Capacity is the number of calls that can be handled by a particular wireless facility. When we make phone calls, our mobile phones communicate with a nearby antenna site that can handle a limited number of calls. It then connects to land based phone lines. When a particular site is handling a sufficient number of calls, the available RF channels assigned to that site are at maximum capacity. When this occurs, the wireless phone user will hear a busy signal on his or her phone. For T-Mobile's specific GSM technology, typical sites with 3 antennas can handle a maximum of approximately 150 calls at any given time. The call traffic at the facility is continually monitored and analyzed so that overloading of sites is prevented. The objective for a capacity site is to handle increased call volume rather than expand a coverage area.

## Alternative Site Analysis

Eliminated from consideration are sites where zoning ordinances prohibit the location, insufficient room for mechanical equipment is available, required setbacks cannot be achieved or landowners are not interested in leasing property.

## Safety and Compliance

The proposed wireless communications facility will not create any nuisance or be detrimental to the health, safety or general welfare, of persons residing or working in the neighborhood. T-Mobile technology does not interfere with any other forms of private or public communications systems, operating under FCC regulations

After construction of the facility, the site will be serviced once a month, during a routine scheduled maintenance window by a service technician. The site is unmanned and is a self-monitored facility. There will be no impact on parking or traffic in the area.

## Community Benefits

Since its inception, wireless communications have provided services to communities far beyond mere convenience. Many businesses and Public Safety Agencies rely on these services in order to conduct important civic and commercial duties on a daily basis. Schools rely on an ability to reach parents quickly. Commercial Wireless companies

have been at the forefront of critical communications services in recent events, such as earthquakes and fires in California. Traffic issues, weather and community events, are a few of the many services now available over these same communications devices. Wireless communications are an integral part of our national telecommunications infrastructure, and each community deserves the benefit of the best and most competitive service available.

## E- 911

In accordance with Federal Communications Commission (FCC) Order 94-102, T-Mobile USA has launched a project to implement enhanced 9-1-1 services (Wireless E9-1-1) for its customers throughout California. Phase I of the project specified that the telephone number and receiving cell site or sector of the 9-1-1 caller be delivered to the 911 dispatch. Phase II adds a more precise location by triangulating on the location, (usually with 50-100 meter accuracy or better) in the form of latitude/longitude coordinates, to the Phase I information.

Many already view wireless phones as a lifeline. Each day more than 200,000 9-11 calls are made on cell phones, which is one third of all emergency calls that are placed.

## T-Mobile Company Information

Based in Bellevue, Washington, the U.S. operations of T-Mobile International AG & Co. K.G., consists of T-Mobile USA, Inc. (formerly VoiceStream Wireless) and Powertel, Inc. (together "T-Mobile"). T-Mobile is one of the fastest growing nationwide wireless service providers, offering all digital voice, messaging and high-speed wireless data services to more than 16.3 million customers in the United States. A cornerstone of T-Mobile's strong consumer appeal has been its Get More® business strategy to provide customers with the best overall value in their wireless service so they can enjoy the benefits of mobile communications to Get More From Life®. T-Mobile has more than 24,000 employees across the country dedicated to delivering on its Get More® promise to provide customers with more minutes, more features and more service. The T-Mobile global brand name made its debut in the United States in July 2002, choosing California and Nevada as the first markets in the country to launch its wireless voice and data services. Here in the Bay Area, T-Mobile has purchased and taken control of the former PacBell Wireless/ Cingular System on January 5, 2005.

T-Mobile holds license in the California Market as follows: 1950.2-1964.8, 1965.2-1969.8 MHz and 1870.2-1884.8, 1885.2-1889.8 MHz.

T-Mobile offers consumers and business customers the most advanced mobile communications services available today, including voice, text messaging, and high-speed wireless data services. T-Mobile operates an all-digital, national wireless network based exclusively on GSM technology.



**Enhanced Messaging Services - SMS, Instant Messaging & MMS**

T-Mobile offers its customers a variety of options for using Short Messaging Service (SMS) or text messaging and Multimedia Messaging Service (MMS).

**SMS:** Every T-Mobile customer, regardless of device or rate plan, can send text messages via their handset to friends and family, no matter which wireless service provider they use. In addition, customers and their colleagues can use the Internet to send and receive text messages between wireless phones, devices and personal computers.

**IM:** T-Mobile customers can use Yahoo! ® Messenger, MSN® Messenger and AOL® Instant Messenger Software to interact with millions of instant messaging users worldwide.

**MMS:** T-Mobile has upgraded its entire national network to provide MMS services. MMS enables customers to complement their text messages with sound, animation and melodies to send to e-mail addresses and compatible handsets. As part of this rich visual communications offering, T-Mobile offers handsets that let customers take a picture and send it to any e-mail address or other MMS-capable phone and then talk about it — all from a single device. Additionally, MMS enables customers to send short video clips to e-mail or other MMS-capable phones, giving T-Mobile customers a whole new way to communicate.

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**2.5G GPRS High Speed Wireless Data**

T-Mobile leverages its national, standards-based GSM network to provide customers with the latest in mobile communications including wireless data access through its T-Mobile Internet service. This allows customers to remotely access the Internet; get their corporate and personal e-mail; keep contacts and calendar information updated on the go; and get popular games, news and information services such as sports scores, stock quotes, horoscopes and games delivered automatically or on demand to their wireless handset or device.

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**T-Mobile HotSpot<sup>SM</sup> - Wi-Fi (802.11b) Wireless Broadband Internet Service**

T-Mobile complements its existing national GSM/GPRS wireless voice and high-speed data network by providing Wi-Fi (802.11b) wireless broadband Internet access in more than 5,000 convenient public locations in the United States where people already go when they're away from their home or office. By combining the benefits of these networks, T-Mobile offers customers coverage where they want it and speed when they need it. T-Mobile is uniquely able to provide a comprehensive wireless service offering that meets customers' needs for wireless connectivity. Backed by T-1 circuits, T-Mobile HotSpot service is reliable and fast enough to accommodate a broad spectrum of applications from checking e-mail to multimedia videoconferencing.

## Statement of Hammett & Edison, Inc., Consulting Engineers

The firm of Hammett & Edison, Inc., Consulting Engineers, has been retained on behalf of T-Mobile, a personal wireless telecommunications carrier, to evaluate the base station (Site No. SF14136) proposed to be located at 840 West California Avenue in Sunnyvale, California, for compliance with appropriate guidelines limiting human exposure to radio frequency ("RF") electromagnetic fields.

### Prevailing Exposure Standards

The U.S. Congress requires that the Federal Communications Commission ("FCC") evaluate its actions for possible significant impact on the environment. In Docket 93-62, effective October 15, 1997, the FCC adopted the human exposure limits for field strength and power density recommended in Report No. 86, "Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," published in 1986 by the Congressionally chartered National Council on Radiation Protection and Measurements ("NCRP"). Separate limits apply for occupational and public exposure conditions, with the latter limits generally five times more restrictive. The more recent Institute of Electrical and Electronics Engineers ("IEEE") Standard C95.1-1999, "Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz," includes nearly identical exposure limits. A summary of the FCC's exposure limits is shown in Figure 1. These limits apply for continuous exposures and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health.

The most restrictive limit for exposures of unlimited duration to radio frequency energy for several personal wireless services are as follows:

Personal Wireless Service	Approx. Frequency	Occupational Limit	Public Limit
Personal Communication ("PCS")	1,950 MHz	5.00 mW/cm <sup>2</sup>	1.00 mW/cm <sup>2</sup>
Cellular Telephone	870	2.90	0.58
Specialized Mobile Radio	855	2.85	0.57
[most restrictive frequency range]	30-300	1.00	0.20

### General Facility Requirements

Base stations typically consist of two distinct parts: the electronic transceivers (also called "radios" or "channels") that are connected to the traditional wired telephone lines, and the passive antennas that send the wireless signals created by the radios out to be received by individual subscriber units. The transceivers are often located at ground level and are connected to the antennas by coaxial cables about 1 inch thick. Because of the short wavelength of the frequencies assigned by the FCC for wireless services, the antennas require line-of-sight paths for their signals to propagate well and so are installed at some height above ground. The antennas are designed to concentrate their energy toward



the horizon, with very little energy wasted toward the sky or the ground. Along with the low power of such facilities, this means that it is generally not possible for exposure conditions to approach the maximum permissible exposure limits without being physically very near the antennas.

### **Computer Modeling Method**

The FCC provides direction for determining compliance in its Office of Engineering and Technology Bulletin No. 65, "Evaluating Compliance with FCC-Specified Guidelines for Human Exposure to Radio Frequency Radiation," dated August 1997. Figure 2 attached describes the calculation methodologies, reflecting the facts that a directional antenna's radiation pattern is not fully formed at locations very close by (the "near-field" effect) and that the power level from an energy source decreases with the square of the distance from it (the "inverse square law"). The conservative nature of this method for evaluating exposure conditions has been verified by numerous field tests.

### **Site and Facility Description**

Based upon information provided by T-Mobile, including drawings by Michael Wilk Architecture, dated January 27, 2006, it is proposed to mount six Andrew Model ADFD1820-6565B directional panel antennas on short poles above the roof of the two-story building located at 840 West California Avenue in Sunnyvale. The antennas would be mounted at an effective height of about 48<sup>1</sup>/<sub>2</sub> feet above ground, 17 feet above the roof, and would be oriented in pairs toward 40°T, 140°T, and 260°T. The maximum effective radiated power in any direction would be 1,652 watts, representing simultaneous operation of seven channels at 236 watts each. There are no reported other wireless base stations installed nearby.

### **Study Results**

For a person anywhere at ground, the maximum ambient RF exposure level due to the proposed T-Mobile operation is calculated to be 0.00012 mW/cm<sup>2</sup>, which is 0.12% of the applicable public exposure limit. The maximum calculated level inside the subject building is 0.055% of the public exposure limit; the maximum calculated level at the second-floor elevation of any nearby residence\* is 0.025% of the public exposure limit. It should be noted that these results include several "worst-case" assumptions and therefore are expected to overstate actual power density levels. Areas on the tile roof in front of the antennas may exceed the public limit.

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\* Located at least 300 feet away, based on aerial photographs from Terraserver.



### Recommended Mitigation Measures

Due to their mounting locations, the T-Mobile antennas are not accessible to the general public, and so no mitigation measures are necessary to comply with the FCC public exposure guidelines. To prevent occupational exposures in excess of the FCC guidelines, no access within 3 feet in front of the T-Mobile antennas themselves, such as might occur during building maintenance activities, should be allowed while the site is in operation, unless other measures can be demonstrated to ensure that occupational protection requirements are met. Posting explanatory warning signs<sup>†</sup> at roof access locations and at the antennas, such that the signs would be readily visible from any angle of approach to persons who might need to work within that distance, would be sufficient to meet FCC-adopted guidelines.

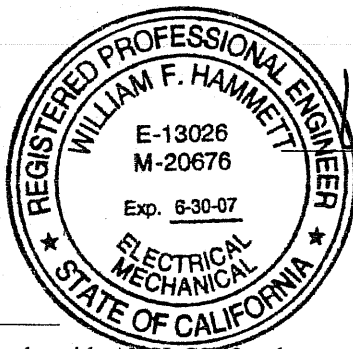
### Conclusion

Based on the information and analysis above, it is the undersigned's professional opinion that the base station proposed by T-Mobile at 840 West California Avenue in Sunnyvale, California, will comply with the prevailing standards for limiting public exposure to radio frequency energy and, therefore, will not for this reason cause a significant impact on the environment. The highest calculated level in publicly accessible areas is much less than the prevailing standards allow for exposures of unlimited duration. This finding is consistent with measurements of actual exposure conditions taken at other operating base stations. Posting of explanatory signs is recommended to establish compliance with occupational exposure limitations.

### Authorship

The undersigned author of this statement is a qualified Professional Engineer, holding California Registration Nos. E-13026 and M-20676, which expire on June 30, 2007. This work has been carried out by him or under his direction, and all statements are true and correct of his own knowledge except, where noted, when data has been supplied by others, which data he believes to be correct.

March 17, 2006



*William F. Hammett*  
William F. Hammett, P.E.

<sup>†</sup> Warning signs should comply with ANSI C95.2 color, symbol, and content conventions. In addition, contact information should be provided (e.g., a telephone number) to arrange for access to restricted areas. The selection of language(s) is not an engineering matter, and guidance from the landlord, local zoning or health authority, or appropriate professionals may be required.

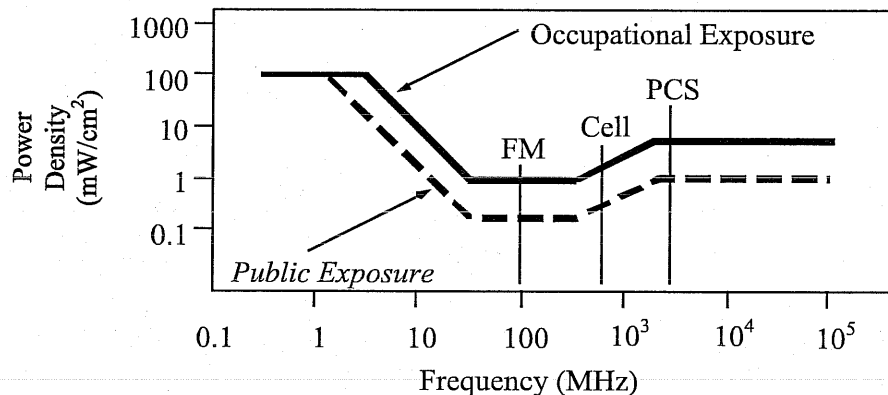


# FCC Radio Frequency Protection Guide

The U.S. Congress required (1996 Telecom Act) the Federal Communications Commission ("FCC") to adopt a nationwide human exposure standard to ensure that its licensees do not, cumulatively, have a significant impact on the environment. The FCC adopted the limits from Report No. 86, "Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," published in 1986 by the Congressionally chartered National Council on Radiation Protection and Measurements, which are nearly identical to the more recent Institute of Electrical and Electronics Engineers Standard C95.1-1999, "Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz." These limits apply for continuous exposures from all sources and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health.

As shown in the table and chart below, separate limits apply for occupational and public exposure conditions, with the latter limits (in *italics* and/or dashed) up to five times more restrictive:

Frequency Applicable Range (MHz)	Electromagnetic Fields (f is frequency of emission in MHz)					
	Electric Field Strength (V/m)		Magnetic Field Strength (A/m)		Equivalent Far-Field Power Density (mW/cm <sup>2</sup> )	
0.3 – 1.34	614	<i>614</i>	1.63	<i>1.63</i>	100	<i>100</i>
1.34 – 3.0	614	<i>823.8/f</i>	1.63	<i>2.19/f</i>	100	<i>180/f<sup>2</sup></i>
3.0 – 30	1842/f	<i>823.8/f</i>	4.89/f	<i>2.19/f</i>	900/f <sup>2</sup>	<i>180/f<sup>2</sup></i>
30 – 300	61.4	<i>27.5</i>	0.163	<i>0.0729</i>	1.0	<i>0.2</i>
300 – 1,500	3.54√f	<i>1.59√f</i>	√f/106	<i>√f/238</i>	f/300	<i>f/1500</i>
1,500 – 100,000	137	<i>61.4</i>	0.364	<i>0.163</i>	5.0	<i>1.0</i>



Higher levels are allowed for short periods of time, such that total exposure levels averaged over six or thirty minutes, for occupational or public settings, respectively, do not exceed the limits, and higher levels also are allowed for exposures to small areas, such that the spatially averaged levels do not exceed the limits. However, neither of these allowances is incorporated in the conservative calculation formulas in the FCC Office of Engineering and Technology Bulletin No. 65 (August 1997) for projecting field levels. Hammett & Edison has built those formulas into a proprietary program that calculates, at each location on an arbitrary rectangular grid, the total expected power density from any number of individual radio sources. The program allows for the description of buildings and uneven terrain, if required to obtain more accurate projections.



**Assessment by Calculation of Compliance with FCC Exposure Guidelines**

The U.S. Congress required (1996 Telecom Act) the Federal Communications Commission ("FCC") to adopt a nationwide human exposure standard to ensure that its licensees do not, cumulatively, have a significant impact on the environment. The maximum permissible exposure limits adopted by the FCC (see Figure 1) apply for continuous exposures from all sources and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health. Higher levels are allowed for short periods of time, such that total exposure levels averaged over six or thirty minutes, for occupational or public settings, respectively, do not exceed the limits.

**Near Field.**

Prediction methods have been developed for the near field zone of panel (directional) and whip (omnidirectional) antennas, typical at wireless telecommunications cell sites. The near field zone is defined by the distance, D, from an antenna beyond which the manufacturer's published, far field antenna patterns will be fully formed; the near field may exist for increasing D until some or all of three conditions have been met:

$$1) D > \frac{2h^2}{\lambda} \qquad 2) D > 5h \qquad 3) D > 1.6\lambda$$

where h = aperture height of the antenna, in meters, and  
 $\lambda$  = wavelength of the transmitted signal, in meters.

The FCC Office of Engineering and Technology Bulletin No. 65 (August 1997) gives this formula for calculating power density in the near field zone about an individual RF source:

$$\text{power density } S = \frac{180}{\theta_{BW}} \times \frac{0.1 \times P_{net}}{\pi \times D \times h}, \text{ in mW/cm}^2,$$

where  $\theta_{BW}$  = half-power beamwidth of antenna, in degrees, and  
 $P_{net}$  = net power input to the antenna, in watts.

The factor of 0.1 in the numerator converts to the desired units of power density. This formula has been built into a proprietary program that calculates distances to FCC public and occupational limits.

**Far Field.**

OET-65 gives this formula for calculating power density in the far field of an individual RF source:

$$\text{power density } S = \frac{2.56 \times 1.64 \times 100 \times RFF^2 \times ERP}{4 \times \pi \times D^2}, \text{ in mW/cm}^2,$$

where ERP = total ERP (all polarizations), in kilowatts,  
 RFF = relative field factor at the direction to the actual point of calculation, and  
 D = distance from the center of radiation to the point of calculation, in meters.

The factor of 2.56 accounts for the increase in power density due to ground reflection, assuming a reflection coefficient of 1.6 ( $1.6 \times 1.6 = 2.56$ ). The factor of 1.64 is the gain of a half-wave dipole relative to an isotropic radiator. The factor of 100 in the numerator converts to the desired units of power density. This formula has been built into a proprietary program that calculates, at each location on an arbitrary rectangular grid, the total expected power density from any number of individual radiation sources. The program also allows for the description of uneven terrain in the vicinity, to obtain more accurate projections.

